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**UTILITY  
PATENT APPLICATION  
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Attorney Docket No.

00EC004/77529

First Inventor or Application Identifier

James L. Beck, III

Title

AUTOMATIC CALL DISTRIBUTOR WITH LANGUAGE BASED  
ROUTING SYSTEM AND METHOD

Express Mail Label No.

EL133503670US

**APPLICATION ELEMENTS**

See MPEP chapter 600 concerning utility patent application contents

**ADDRESS TO:**

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1. ☒ \*Fee Transmittal Form (e.g. PTO/SB/17)  
(Submit an original and a duplicate for fee processing)

5. ☐ Microfiche Computer Program (Appendices)

2. ☒ Specification  
(preferred arrangement set forth below) Total Pages **11**

6. Nucleotide and/or Amino Acid Sequence Submission  
(if applicable, all necessary)

- Descriptive title of the Invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to Microfiche Appendix
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings (if filed)
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

a. ☐ Computer Readable Copy

b. ☐ Paper Copy (identical to computer copy)

c. ☐ Statement verifying identity of above copies

3. ☒ Drawing(s) (35 U.S.C. 113) Total Sheets **1**

**ACCOMPANYING APPLICATION PARTS**

7. ☒ Assignment Papers (cover sheet & document(s))

8. ☐ 37. C.F.R. § 3.73(b) Statement (when there is an assignee) ☐ Power of Attorney

9. ☐ English Translation Document (if applicable)

10. ☐ Information Disclosure Statement (IDS) PTO-1449 ☐ Copies of IDS Citations

11. ☐ Preliminary Amendment

12. ☒ Return Receipt Postcard (MPEP 503)  
(Should be specifically itemized)

13. ☐ \*Small Entity Statement(s) (PTO/SB/09-12)0 ☐ Statement filed in Prior application, Status still proper and desired

14. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)

15. ☐ Other: \_\_\_\_\_

4. Oath or Declaration

Total Pages **2**

a. ☒ Newly executed (original or copy)

b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))  
(for continuation/divisional with Box 16 completed)

i. ☐ **DELETION OF INVENTOR(S)**  
Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

\*NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

16. If a **CONTINUING APPLICATION**, check appropriate box, and supply the requisite information below and in a preliminary amendment

☐ Continuation ☐ Divisional ☐ Continuation-In-Part (CIP) Of prior application No.: 09/243,870

Prior application information: Examiner not yet assigned Group/Art Unit:  
**FOR CONTINUATION or DIVISIONAL APPS ONLY:** The entire disclosure of the prior application, from which an oath or declarations supplied Under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by Reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

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## AUTOMATIC CALL DISTRIBUTOR WITH LANGUAGE BASED ROUTING SYSTEM AND METHOD

### Field of the Invention

5        This invention relates generally to telephony, and more particularly, to automatic call distributors.

### Background of the Invention

10        An automatic call distributor (ACD) is a system that facilitates the management of incoming and outgoing calls at telephone call centers. Traditionally, an ACD consisted of a specialized telephone switch for routing customer calls to available agents. The method for routing such calls is typically based on obtaining an equitable distribution of calls for each agent.

15        Today, like all business entities, call centers are experiencing incredible growth due to an increasingly interconnected, global and digital world. Incident to the operation of call centers is the accumulation of vast quantities of valuable information. In response to the availability of such information, owners of these call centers are demanding ACD systems with more sophisticated information management and channeling capabilities. Thus, modern ACD systems  
20        commonly incorporate various management tools including automated call identification, automated agent selection, automated call distribution, automated voice response, data integration, voice messaging, automated outbound call management, and real time displays that forecast load and analyze historical data.

25        Furthermore, modern ACD systems typically use improved methods for routing calls other than the traditional method based on equitable distribution. One such method is skill based routing. Skill based routing is typically based on the identity of the caller or on the number called and enables a call center to route calls to the agent most qualified to handle the customer request. When  
30        coupled, for example, with additional services such as a Dialed Number Identification Service (DNIS) that identifies a particular service number called by

a customer, skill based routing can greatly increase the productivity of a call center.

While skill based methods for routing calls are commonly found in modern ACD systems, there is no known analogous development of a language based method of routing calls. However, in an increasingly global business environment, the need to identify the native language of customers is obvious. For example, when a customer answers the phone during an outdialing campaign, she may not necessarily speak the same language as the agent handling the call. Thus, regardless of any advantages that skill based routing might provide, such language barriers lead to confusion between the agent and customer which ultimately decreases productivity for the call center.

In March 1997, the U.S. Census Bureau estimated that the foreign born population of the United States was 25.8 million. This represents the largest foreign born population in United States history and an increase of 30 percent over the 1990 statistics (see Schmidley, A. Dianne and Campbell Gibson, U.S. Census Bureau, Current Population Reports, Series P23-195, Profile of the Foreign Born Population in the United States: 1997, U.S. Government Printing Office, Washington, D.C. 1999). Furthermore, marketing studies and commentaries have suggested that people feel more comfortable conducting business in their native languages (see "Spanish Language Advertising Most Effective, Even For Bilingual", Minority Markets Alert, Vol. 6, No. 12, 12/1/94; Hamlyn, Helen, "Speaking the language of your customer", Telemarketing, Vol. 11, No. 12, 6/1/93). Therefore, with the significant increase of non-English speaking households in the United States, call centers must be able to identify and service customers in their native languages in order to conduct effective business.

#### Summary of the Invention

Accordingly, the present invention provides a method and system for determining a language of a call handled by an automatic call distributor. The method includes the steps of detecting the call, sampling an audio portion of the

call, fitting a plurality of templates to the sampled portion of the call, and determining a language of the call based upon a best relative fit between one of the plurality of audio templates and the sampled portion of the call.

Similarly, the automatic call distributor system, comprises, in part,  
5 capabilities for detecting a call. Once the call is detected, the system may sample an audio portion of the call and attempt to match the audio sample to one of a plurality of audio templates that has the best relative fit. By doing so, the automatic call distributor is able to determine the language of the call and can route the call to an appropriate response service. Such response services may  
10 include, but are not limited to, human agents, voice response units (VRU), or interactive voice response (IVR) applications. If, however, the system is unable to obtain a best relative fit, it may ultimately route the call to a default agent.

One of the primary objectives of the invention is to identify the language of a customer who answers the phone during an outdialing campaign. When a  
15 customer answers the phone, they typically speak a greeting in their native language. For example, a Spanish speaking person might answer the phone by saying "BUENO". The automatic call distributor would analyze the voice pattern of this initial greeting and compare it against sample greeting patterns in different languages to determine the customer's language.

Another main objective of the invention is to route the call to a response  
20 service capable of servicing the language of the customer. Such a service might be a human agent who can speak the language or an automated voice response unit with messages recorded in the language of the customer.

The advantages of identifying and routing a call based on the language of  
25 the customer are increased efficiency and productivity at the call center and higher customer satisfaction with call center service.

Further objectives, advantages and features of the invention will become apparent from the following detailed description of preferred embodiments of the present invention when taken in conjunction with the accompanying drawings in  
30 which like reference numerals designate like elements throughout the different views.

### Brief Description of the Drawings

FIG. 1 is a functional block diagram of the preferred embodiment of the automatic call distributor system of the present invention coupled to an external public switching telephone network (PSTN).

FIG. 2 is a functional block diagram of the preferred embodiment of the interactive voice response (IVR) unit within the automatic call distributor of FIG 1.

### Description of the Preferred Embodiment

Referring the drawings, FIG 1. illustrates one preferred embodiment of an automatic call distributor (ACD) **100** with language recognition means. The ACD **100** receives inbound calls from and places outbound calls to customers **102** through an external public switching telephone network **104**. The ACD **100** is controlled by a central processing unit (CPU) **106** coupled to a memory unit **108** which contains, in part, software that guides the switch **110** and contains the profile information describing, in part, the language capabilities of the human agents **112** and the voice response units (VRU) **114** that are coupled to the switch **110**. The switch **110** has several ports for connection to human agents **112**, VRUs **114**, and to supervisory and other units (not shown). Each human agent **112** is qualified to handle customer calls in at least one particular language. The agents **112** may each have a control console (not shown) with a keyboard and video display for inputting and retrieving data in response to various types of calls. Similarly, each VRU **114** includes at least one prompting script recorded in at least one particular language to obtain information from customers who speak that language. In one preferred embodiment of the invention, each VRU **114** includes several prompting scripts recorded in several different languages so that the VRU **114** can simultaneously handle several different customer calls in several different languages. Furthermore, the ACD **100** includes an interactive voice response (IVR) unit **116** that embodies the language recognition means. Upon determining the language of a call, this IVR

**116** communicates this information to the CPU **106** which then properly routes a customer call to an appropriate agent **112** or VRU **114**.

With reference to FIG. 2, the IVR **116** of the ACD **100** in FIG 1 is also controlled by a CPU **200** coupled to a memory unit **202** which contains in part, language recognition software **206** and a plurality of audio language templates **204**. When the ACD **100** in FIG 1 detects the completion of an outbound call, the IVR **116** immediately engages its voice sampling unit **208** which samples the greeting answer of the customer, storing it in the memory unit **202**. The CPU **200** analyzes and processes the sampled greeting of the customer by comparing it against the plurality of audio language templates **204** to find a best relative fit. Once the CPU **200** identifies the language of the sampled greeting of the customer, it conveys this information to the CPU **106** of the ACD **100** in FIG 1. Upon reception of such information, the ACD **100** in FIG 1 switches the customer call to an agent **112** or VRU **114** to service the call in the proper language.

In an alternative embodiment of FIG 1, the ACD **100** also extracts additional information from the external PSTN **104** when dealing with incoming customer calls. In one embodiment of the invention, such additional information might include a Dialed Number Identification Service (DNIS) to identify which of a plurality of service numbers a customer actually called, or an Automatic Number Identification (ANI) service to identify the number of the calling customer. Such additional information would be used in conjunction with certain databases in order to make an initial determination of the language of the calling customer.

For example, in one embodiment, the external PSTN provides the surname of the calling customer to the ACD. The ACD then uses a best guess method to determine the language of the caller corresponding to the surname and switches the call to an appropriate agent or VRU. In an alternative embodiment, the ACD uses the ANI number to identify a geographic location of the calling customer to determine whether there is a specific language associated with that location. For instance, in either of these embodiments, one could envision an IVR in the ACD greeting the calling customer with a salutation in the "best guessed" determined language. The ACD would then analyze the

response of the calling customer to confirm that the best guessed language was indeed the proper language to use. If the CPU 200 should determine that the initial language was incorrect, the CPU 200 reconnects the call to the appropriate response service.

- 5           In another embodiment, the ACD is coupled to an internal database that stores the language used by a repeat customer. Upon obtaining the ANI number of a calling repeat customer, the ACD determines the language of the customer by accessing the database through the ANI number. In yet another embodiment of the invention, the ACD is coupled to a database, internal or  
10       external, that provides marketing information associated with the ANI number, including the language of the customer.

- While a detailed description of the preferred embodiment of the invention has been given, it should be understood that implementation of other variations and modifications of the invention and its various aspects will be apparent to one  
15       skilled in the art, and that the invention is not limited by the specific embodiments described. Therefore, it is contemplated to cover the present invention, any and all modifications, variations, or equivalents that fall within the true spirit and scope of the basic underlying principles disclosed and claimed herein.

I claim:

1. A method of determining a language of a call handled by an automatic call distributor, such method comprising the steps of:

- 5        detecting the call;  
      sampling an audio portion of the call;  
      fitting a plurality of audio templates to the sampled portion of the call; and  
      determining a language of the call based upon a best relative fit between  
one of the plurality of audio templates and the sampled portion of the call.

10        2. The method of determining a language as in claim 1 wherein the audio templates further comprises audio language templates.

15        3. The method of determining a language as in claim 1 further comprising the step of routing the call to a response service based on the language of the call.

20        4. The method of determining a language as in claim 3 wherein the step of routing further comprises selecting one of a group consisting of agents and voice response units.

25        5. The method of determining a language as in claim 4 wherein the step of routing further comprises selecting a default response service for servicing unidentified languages.

      6. The method of determining a language as in claim 4 wherein the step of routing further comprises selecting a voice response unit having a plurality of stored language scripts.

30        7. An automatic call distributor with language recognition means, comprising:



means for detecting a call;  
means for sampling an audio portion of the call;  
means for fitting a plurality of audio templates to the sampled portion of  
the call; and

5 means for determining a language of the call based upon a best relative fit  
between one of the plurality of audio templates and the sampled portion of the  
call.

8. The automatic call distributor of claim 7 wherein the audio templates  
10 further comprises audio language templates.

9. The automatic call distributor of claim 7 further comprising means for  
routing the call to a response service based on the language of the call.

15 10. The automatic call distributor of claim 9 wherein the means for  
routing further comprises means for selecting one of a group consisting of agents  
and voice response units.

20 11. The automatic call distributor of claim 10 wherein the means for  
routing further comprises means for selecting a default response service for  
servicing unidentified languages.

25 12. The automatic call distributor of claim 9 wherein means for routing  
further comprises means for selecting a voice response unit having a plurality of  
stored language scripts.

13. A method of routing a call based on a language of a customer  
comprising the steps of:  
detecting the call;  
30 determining the language of the customer; and  
routing the call to a response service based on the language.

14. The method of routing a call as in claim 13 wherein the determining step further comprises:

sampling an audio portion of the call;

5 fitting a plurality of audio templates to the sampled portion of the call; and  
determining the language of the call based upon a best relative fit between one of the plurality of audio templates and the sampled portion of the call.

10 15. The method of routing a call as in claim 13 wherein the determining step further comprises identifying the customer based upon an ANI as a repeat customer and accessing a database that stores the language of the repeat customer.

15 16. The method of routing a call as in claim 13 wherein the determining step further comprises basing the determination, in whole or in part, on a surname of the customer.

20 17. The method of routing a call as in claim 13 wherein the determining step further comprises basing the determination, in whole or in part, on marketing information associated with the customer.

25 18. The method of routing a call as in claim 13 wherein the determining step further comprises basing the determination, in whole or in part, on a geographic location associated with the customer.

19. An automatic call distributor with language recognition means, comprising:

means for detecting a call;

30 means for determining a language of a customer; and

means for routing the call to a response service based on the language.

20. The automatic call distributor of claim 19 wherein the determining means further comprises

means for sampling an audio portion of the call;

5 means for fitting a plurality of audio templates to the sampled portion of the call; and

means for determining the language of the call based upon a best relative fit between one of the plurality of audio templates and the sampled portion of the call.

10

21. The automatic call distributor of claim 19 wherein the determining means further comprises means for identifying the customer as a repeat customer and means for accessing a database that stores the language of the repeat customer.

15

22. The automatic call distributor of claim 19 wherein the determining means further comprises means for basing the determination, in whole or in part, on a surname of the customer.

20

23. The automatic call distributor of claim 19 wherein the determining means further comprises means for basing the determination, in whole or in part, on marketing information associated with the customer.

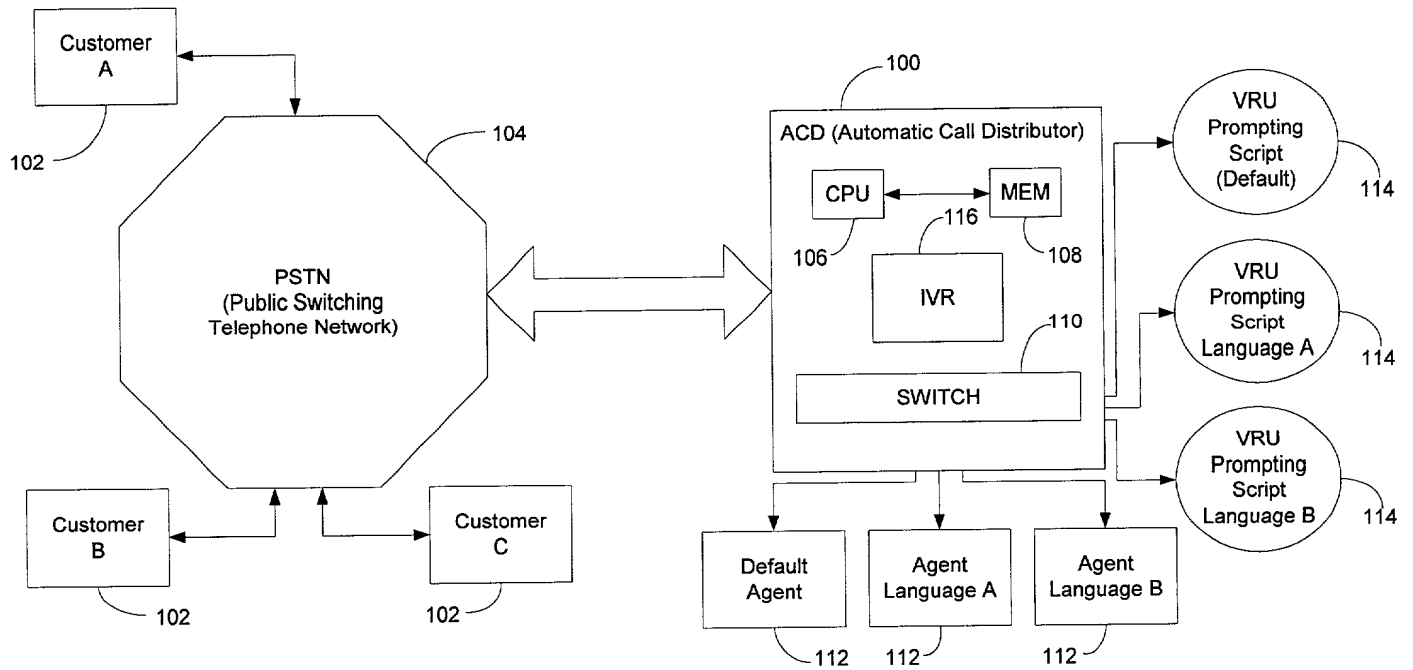
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24. The automatic call distributor of claim 19 wherein the determining means further comprises basing the determination, in whole or in part, on a geographic location associated with the customer.

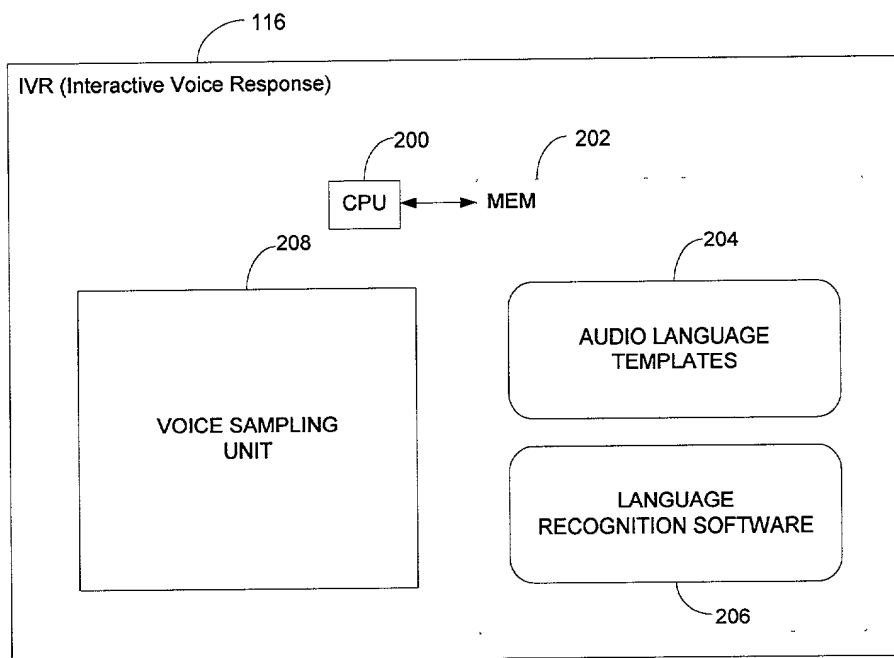
## ABSTRACT

- A method and system for determining a language of a call handled by an automatic call distributor is disclosed. The method includes the steps of
- 5 detecting the call, sampling an audio portion of the call, fitting a plurality of templates to the sampled portion of the call, and determining a language of the call based upon a best relative fit between one of the plurality of audio templates and the sampled portion of the call.

# FIG. 1



# FIG. 2



**DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I hereby declare:

That my residence, post office address and citizenship are as stated below next to my name.

That I verily believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**AUTOMATIC CALL DISTRIBUTOR WITH LANGUAGE BASED ROUTING SYSTEM AND METHOD**

the specification of which is attached hereto.

That I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

That I acknowledge the duty to disclose information to be material to patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

That I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate on this invention having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)      None

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below.

_____	_____
(Application Number)	(Filing Date)

_____	_____
(Application Number)	(Filing Date)

That I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

United States Application(s)

_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)-(Patented, pending, abandoned)

_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)-(Patented, pending, abandoned)

That all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

I hereby appoint the following attorneys, with full power of substitution and revocation, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith and request that all correspondence and telephone calls in respect to this application be directed to WELSH & KATZ, LTD., 120 South Riverside Plaza, 22nd Floor, Chicago, Illinois 60606, Telephone No. (312) 655-1500.

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